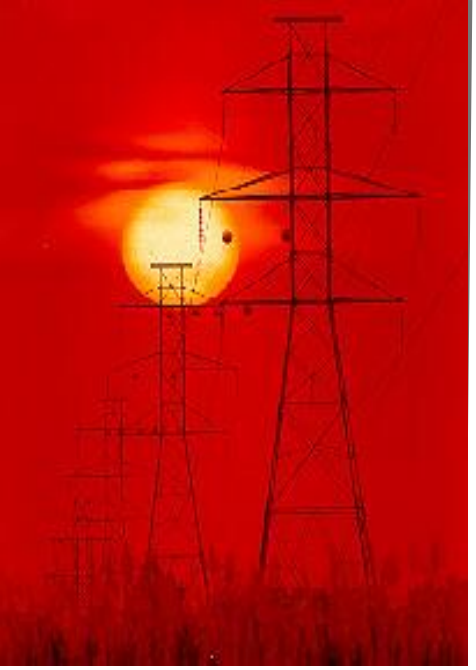


Phase 2 Communications

Combining IEC 61850 Information Model with Mappings to DNP3 and to ModBus

June 21, 2013

1 – 2 pm

Xanthus Consulting International

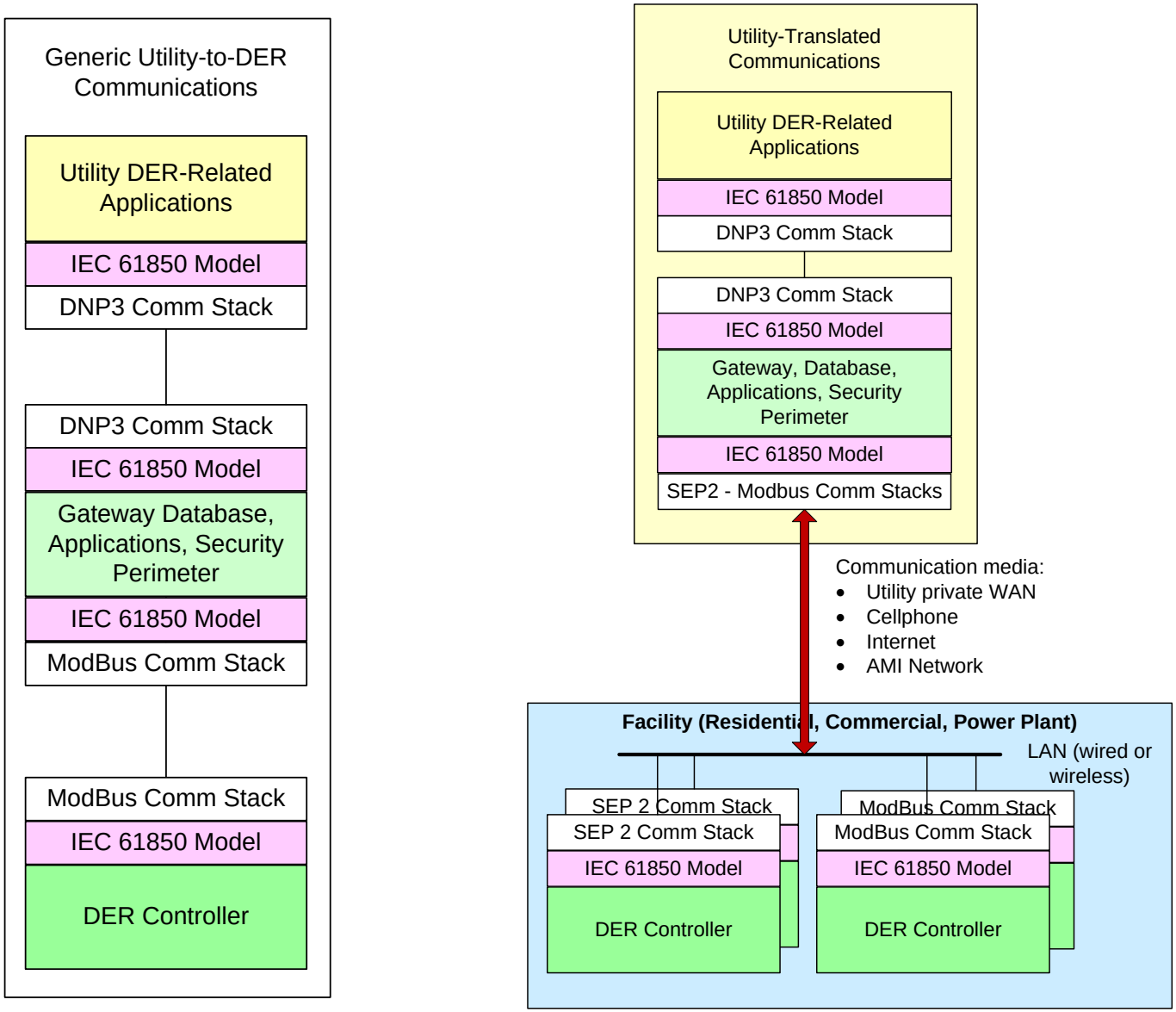
Communication Realities

- Many different communication media will be used, often in combination with each other:
  - Radio-based mesh networks
  - Cellphone networks
  - Fiber optic or leased wide area networks
  - The Internet
- Different communication protocols (bits and bytes) will be used:
  - DNP3
  - ModBus
  - SEP 2
  - Web services
- One information model must be used for interoperability:
  - IEC 61850 information model
- Cyber security must be provided

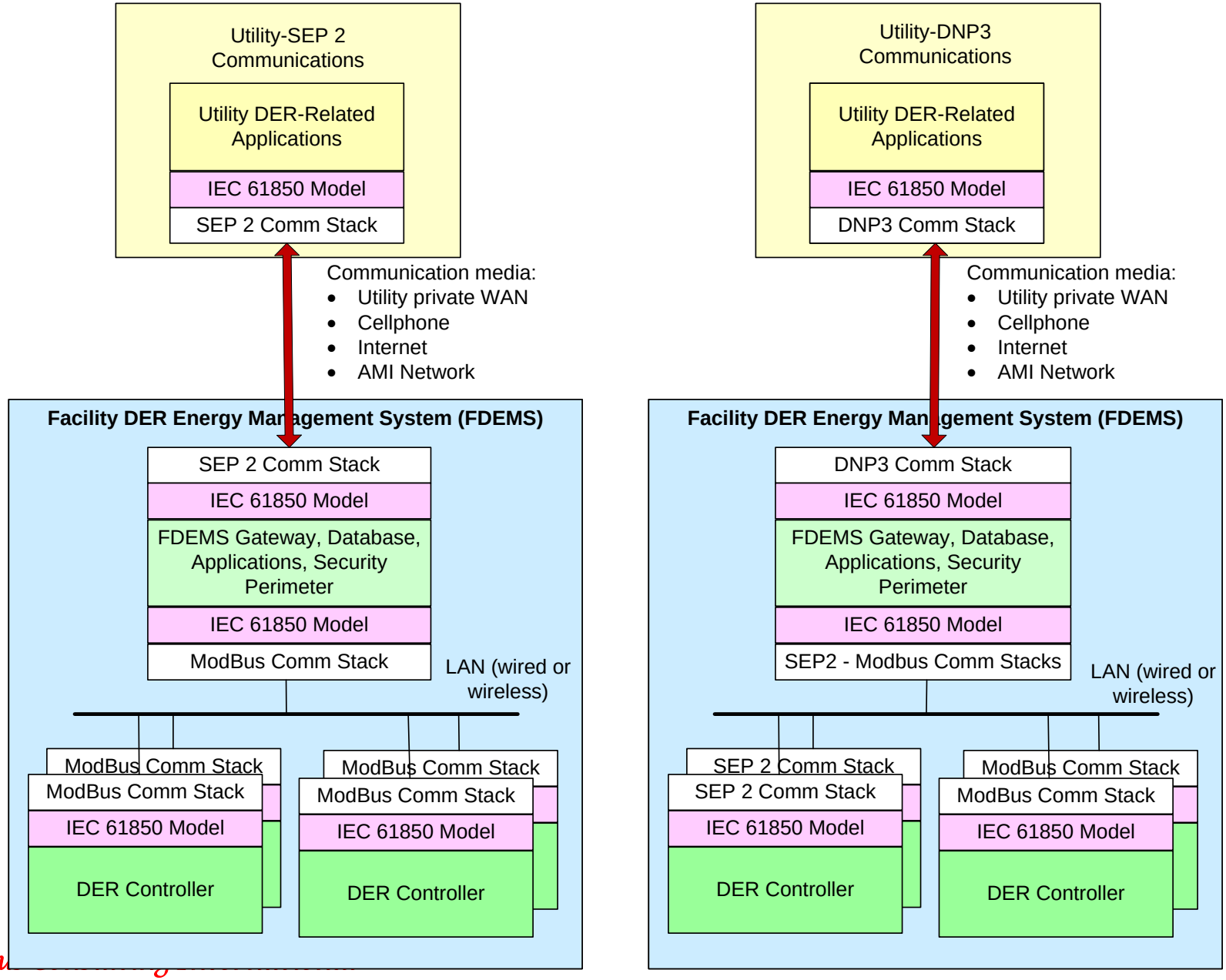
Communication Issues

- If different communication protocols are used, they must be translated in “gateways”
- Question on who would provide and maintain these gateways:
  - Implementers could provide them for larger DER systems
  - Utilities could provide them for groups of smaller DER systems, possibly within substations
- Cyber security requires the authentication of users and devices, and must address confidentiality and privacy
  - Cryptographic key management must be provided for all DER systems with communications, whether utility-owned or customer-owned

Utility Provides Mapping Gateway for DER Interactions

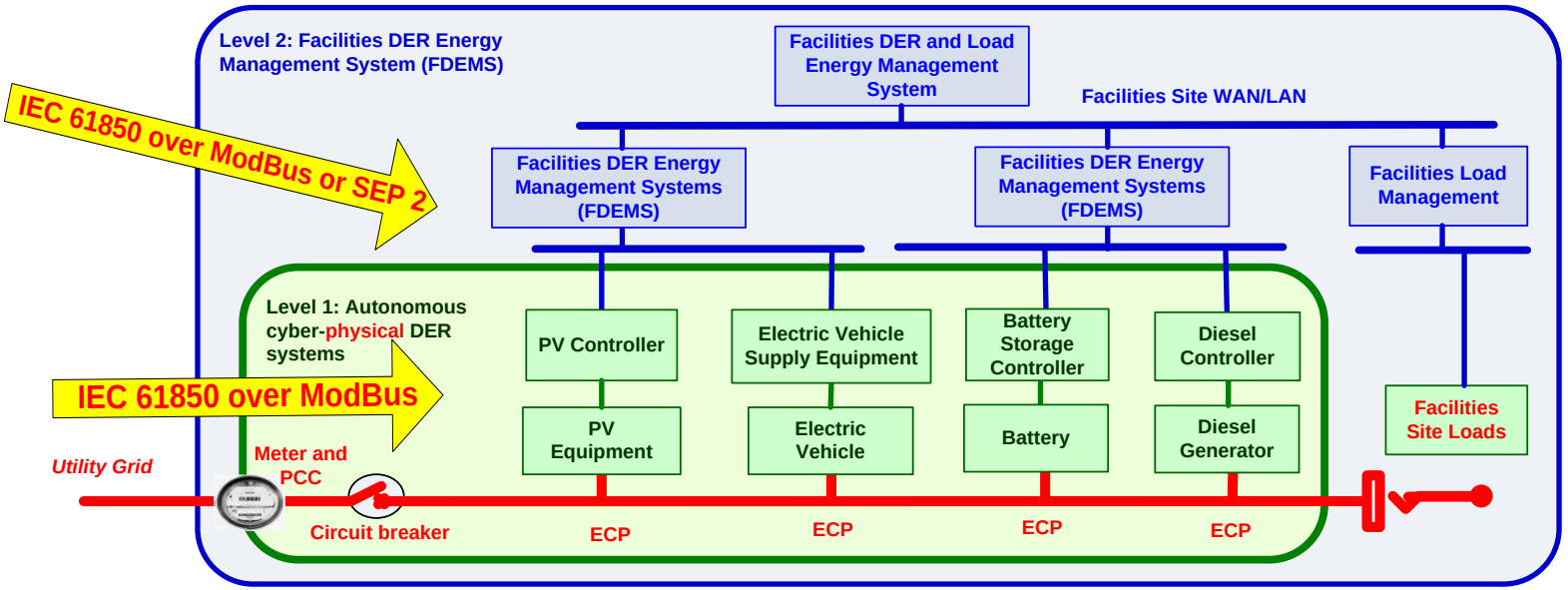


Facility DER Energy Management System Provides Mapping Gateway



Level 2: Facilities DER Energy Management System (FDEMS) to Manage Groups of DER Systems

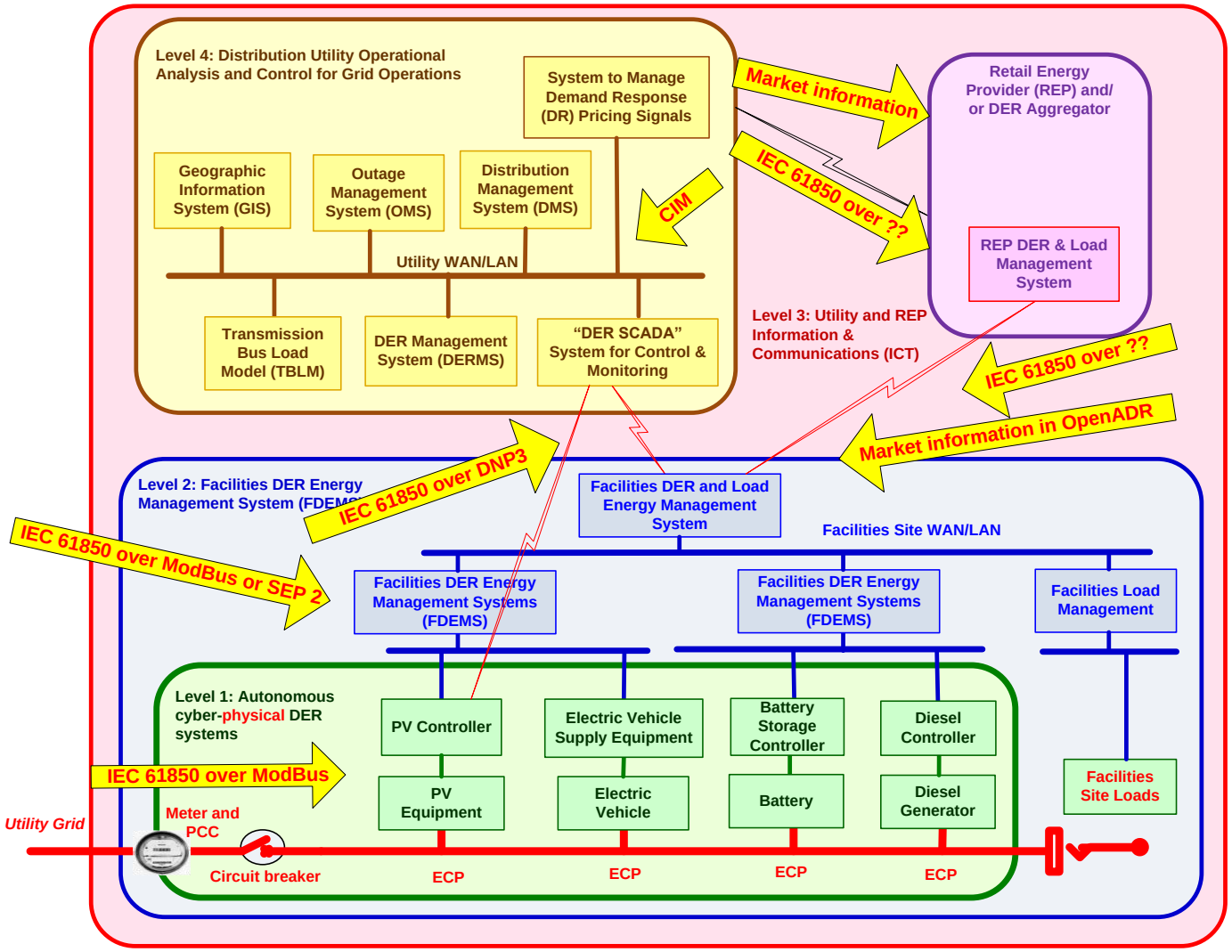
FDEMS communicate with DER controllers to monitor, control, or request actions. May include multiple layers of DER Management systems.

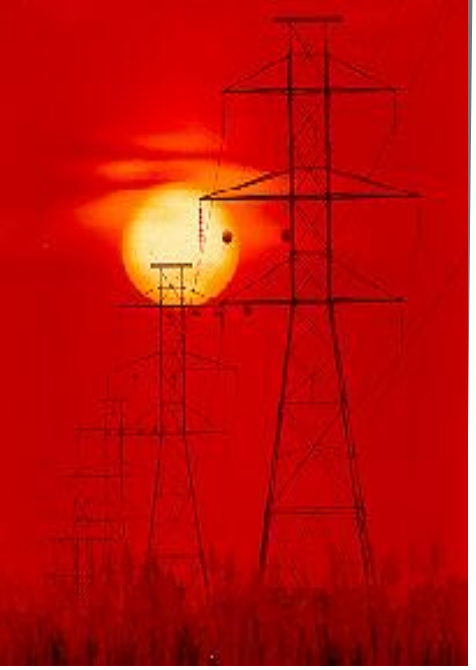


- IEC 61850-7-420/90-7 Information Models should be used between the DER controllers and the Facilities Energy Management Systems
- ModBus is predominantly used, while alternative protocols include SEP 2.0, OPC/UA, and BACnet.
- MMS (61850-8-1) may be used in Europe

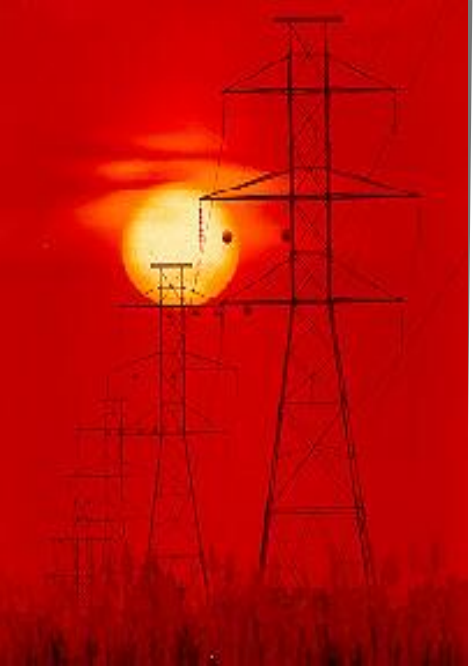
Level 3: Utility and REP Information and Communication Technologies (ICT) Interactions with DER Systems

Includes many different scenarios





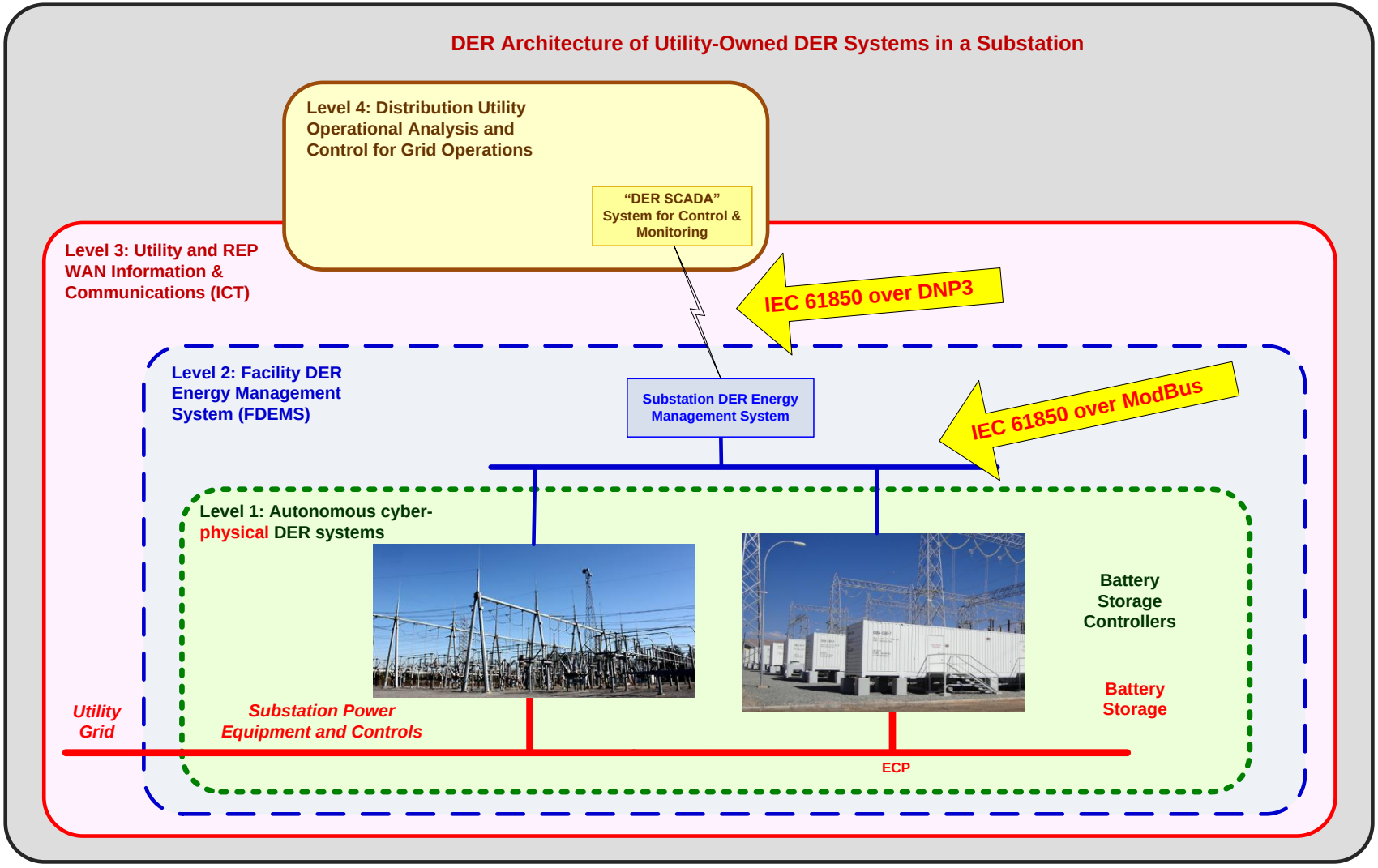
Discussions?



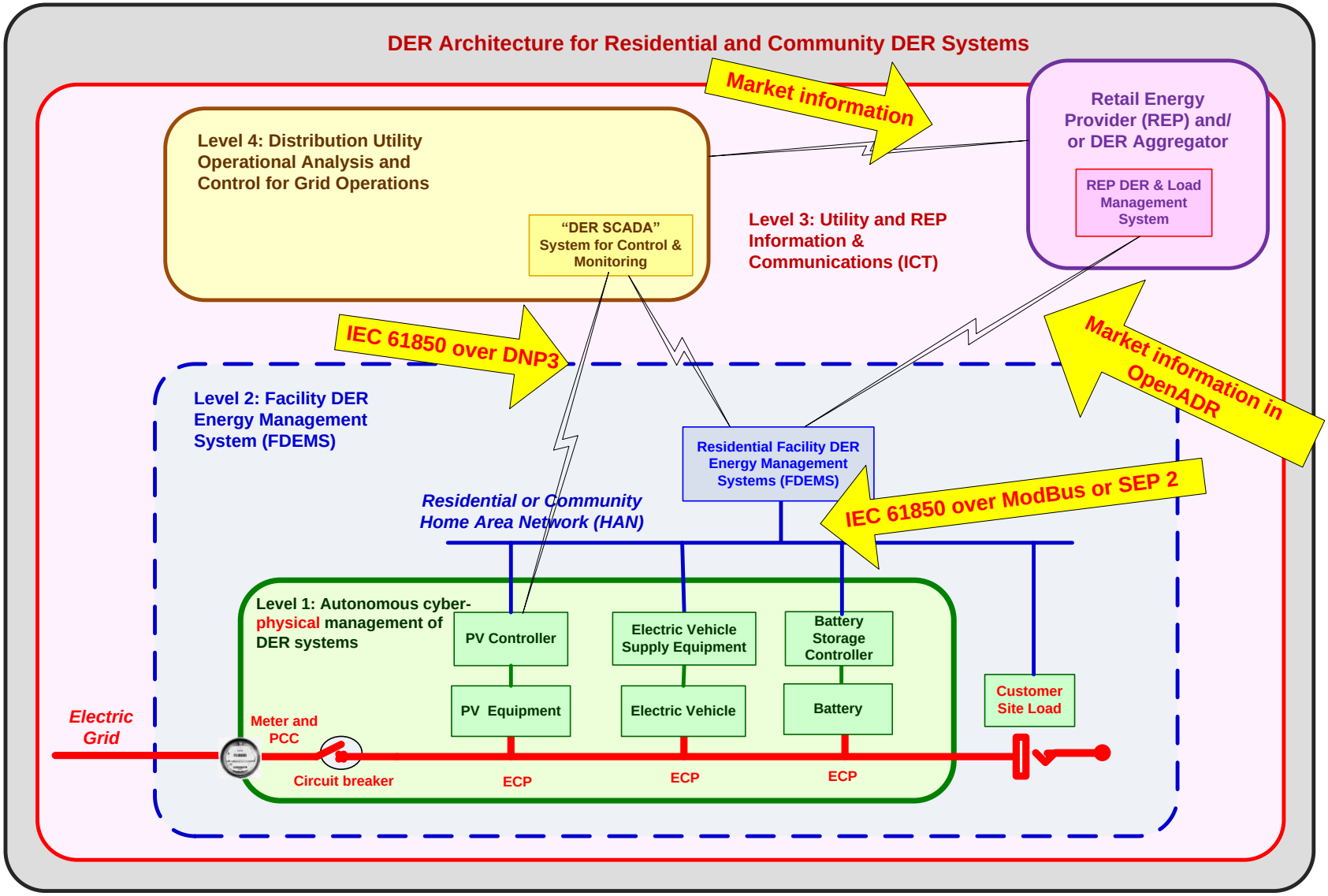
Extra Communication Slides

For reference only – not to be presented

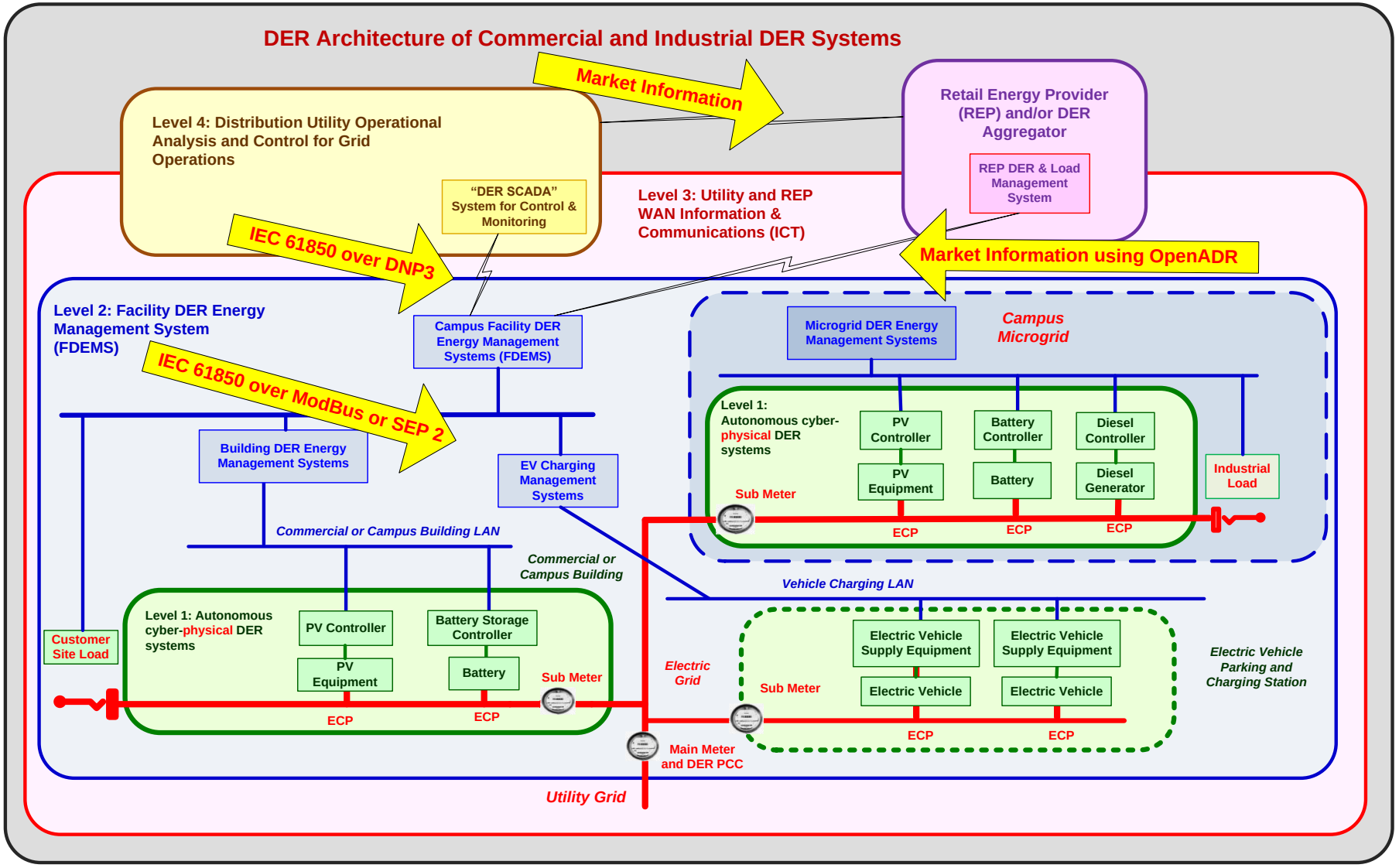
Level 3a: DER Systems in Substations



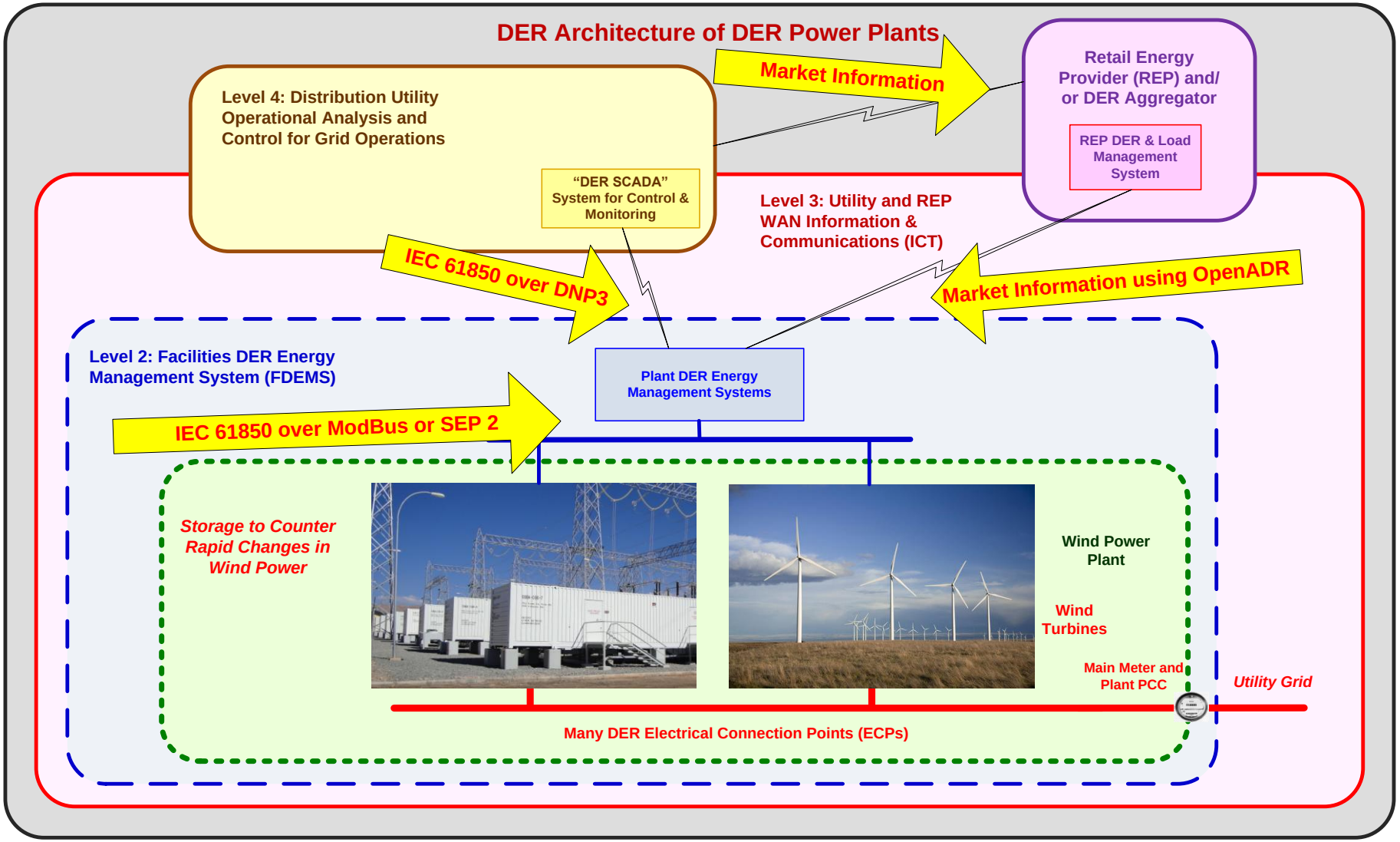
Level 3b: DER Systems in Residences and Communities



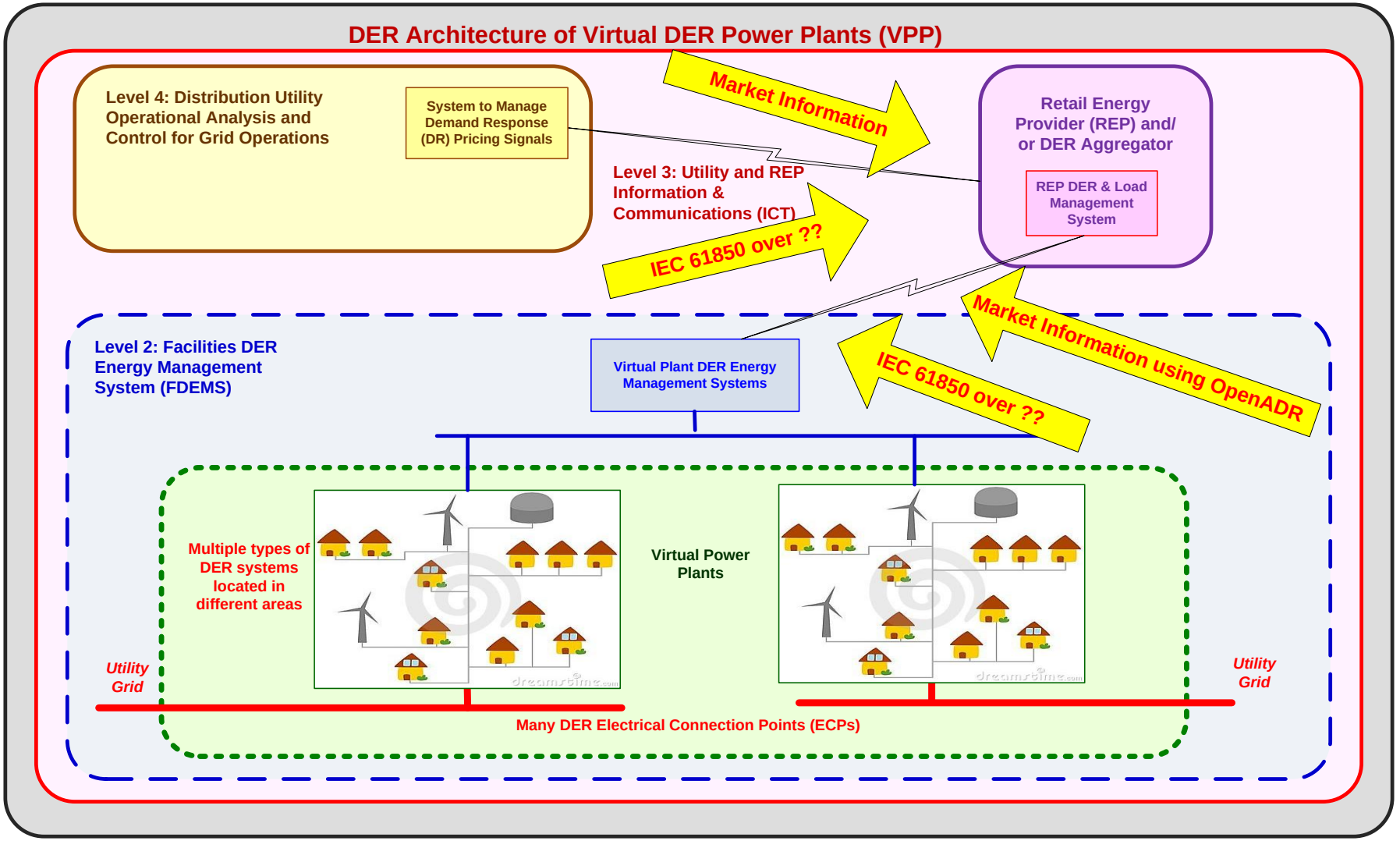
Level 3c: DER Systems in Commercial or Industrial Sites



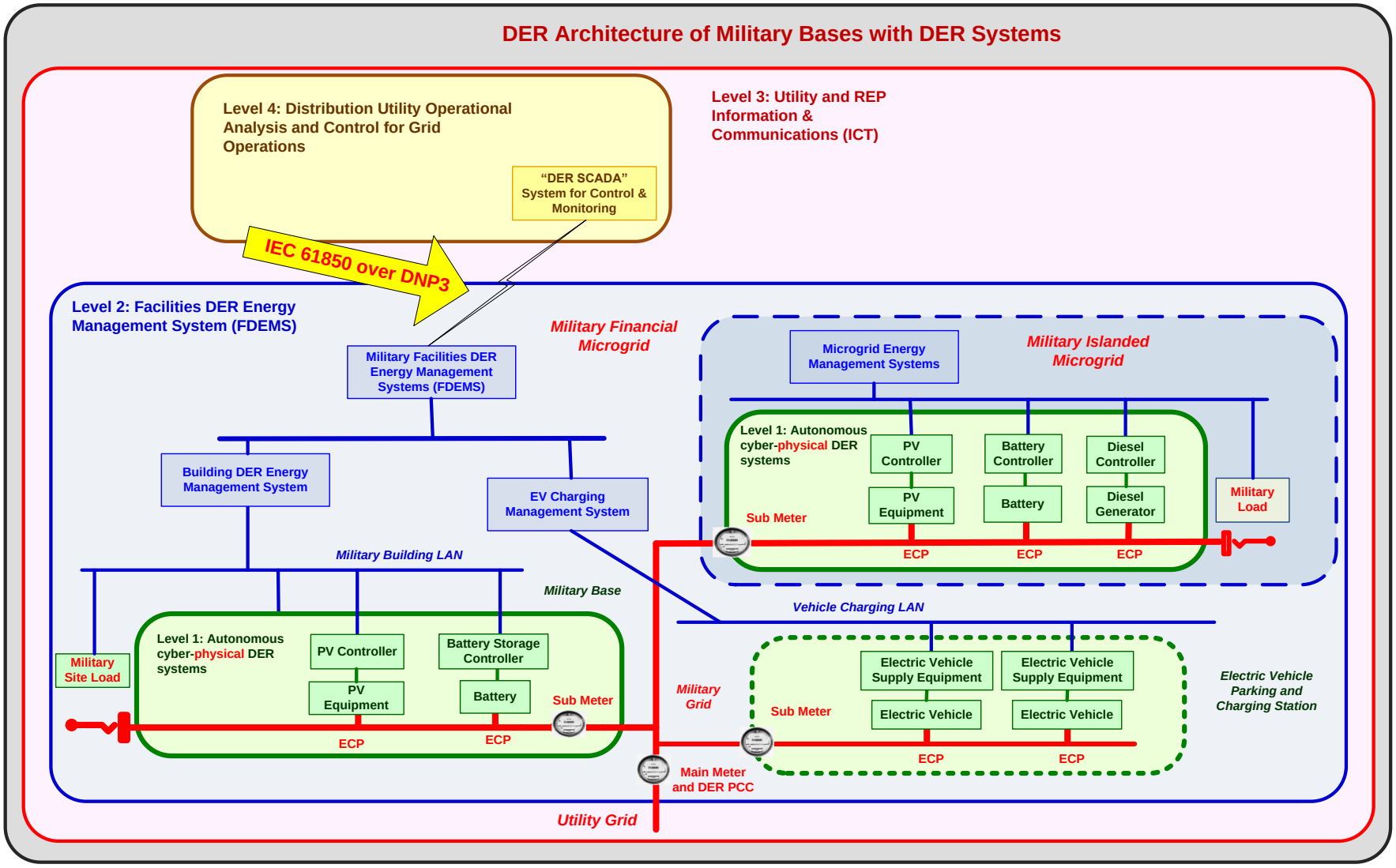
Level 3d: DER Power Plants



Level 3e: DER Virtual Power Plants (VPP)



Level 3f: Military



Level 3g: Microgrids – Grids that can become intentionally islanded, but may remain grid-connected when financially beneficial